



Awoleke JO* and Akintayo AA

Department of Obstetrics and Gynaecology, Ekiti State University, Ado Ekiti, Ekiti State, Nigeria

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***Corresponding author:** Awoleke JO, Doctor, Department of Obstetrics and Gynaecology, Ekiti State University, Ado-Ekiti, Ekiti State, Nigeria, Tel: 08063289272; E-mail: bisijacob@yahoo.co.uk

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Research Article

The Use of Abdominal Paracentesis in the Diagnosis of Ectopic Pregnancy in a Resource – Limited Setting

Abstract

Ectopic pregnancy remains an important cause of morbidity and mortality in the first trimester of pregnancy, and has become a major public health challenge among women in the reproductive age group in this environment. A review of 139 consecutive cases of tubal ectopic gestations managed over a five year period at the Ekiti State University Teaching Hospital, Ado – Ekiti, Nigeria was conducted. Ectopic pregnancies accounted for 1.8% of all deliveries. Most of the women were married (68.3%), between 26 – 30 years (28.8%) and of low parity [0 and 1] (61.9%), and all had abdominal pain. Induced abortion (72.7%) was the commonest factor and the levonorgestrel-containing pill was the commonest contraceptive (19/43) associated with ectopic pregnancy. 16.5% were severely anaemic at presentation, 1 in 6 women had prior uterine evacuation as a result of wrong diagnosis, 26.7% had massive haemoperitoneum (≥ 2000 millilitres) and salpingectomy (84.1%) was the commonest operative procedure. Paracentesis was positive in 84.6% of cases and negative in the only unruptured case. The correct diagnosis was missed in a third of the patients at presentation. The case fatality rate was 0.7%.

While improved diagnostic methods will reduce late presentations and tubal rupture, thereby improving the chances of tubal salvage and future reproductive outcome, a diagnostic algorithm that will include abdominal paracentesis may help to increase the pickup rate of ectopic pregnancy and be an impetus for immediate intervention in resource-poor settings.

Introduction

Ectopic pregnancy (EP) is an increasingly prevalent and potentially fatal condition for which patients often present to the emergency department. It remains an important cause of morbidity and mortality in early pregnancy, particularly in the tropics [1].

Globally, 10 – 15% of maternal deaths occurring in the first trimester are due to ectopic pregnancy [2]. The incidence has increased worldwide with an increase in pelvic infections, advances in assisted reproductive technology, tubal surgeries and sterilizations, use of intrauterine contraceptive devices and improvements in the diagnostic techniques leading to identification of cases that otherwise would have resolved without causing symptoms [3–5]. In spite of this, the case fatality in many developed countries has been on the decline [6,7]. However, the specific burden of EP in low resource nations, especially sub-Saharan Africa is less precise due to possible shortcomings in documentation and reporting, delays in seeking or reaching healthcare facilities and the use of different denominators for reporting EP rates [8,9].

Recent advances in technology have led to earlier diagnosis, increasing use of conservative surgeries and medical management with the possibility of preserving future reproductive outcome [10,11]. Data from developing countries generally suggest challenges with diagnosis (such as delayed presentation and misdiagnosis) such that most of the patients would require salpingectomy that can result into tubal loss and diminished reproductive potential [12]. While sensitive quantitative assays of human chorionic gonadotrophin (hCG), transvaginal ultrasonography and laparoscopy have revolutionized the diagnosis of EP in developed nations, resource-constrained countries, for the time being, will need to develop diagnostic algorithms that may include peritoneal puncture such that simple and expeditious attempts at diagnosis can still be made without worsening the already grim morbidity – mortality figures from EP.

Thus, this study was conducted to review the presentation and therapeutic modalities employed in the management of this condition in the apex health institution in Ekiti State and identify areas of improvement.

Method

Study design

The study is a retrospective evaluation of women with ectopic gestation managed at the Ekiti State University Teaching Hospital, Ado – Ekiti, Ekiti State, Nigeria between March 2009 and February 2014. The operations register and the gynaecological ward admission records were used to identify patients who had a diagnosis of, and were managed for EP. The case records were then retrieved from the Health Information Management Unit.

Data collection

Information on the biosocial and clinical variables, including the laboratory results of the patients and the use of abdominal paracentesis were extracted from the case records and entered into an Excel spread sheet. Abdominal paracentesis was usually performed by the Medical Officers in the Emergency Room or a resident doctor. When non-clotting blood was obtained from the peritoneal cavity, it was reported as positive; if clear peritoneal fluid, it was negative. Non-diagnostic paracentesis is regarded as any other result including blood that clotted or tests that did not retrieve any fluid. The Labour Ward register was used to obtain data on the deliveries that were conducted during the study period.

Data analysis

The data thus obtained was analysed using simple descriptive statistics and expressed as percentages.

Results

During the study period, there were 153 cases of tubal EP and 8401 deliveries at the Ekiti State University Teaching Hospital, Ado – Ekiti. The incidence of EP was 1.8% or 1 in 55 deliveries. 139 case records were obtained and had documented data required for the audit. They form the subjects of this study.

Table 1 showed the socio-demographic characteristics of the patients. The ages ranged between 17 and 46 years, mean of 29.65 ± 6.0 years and majority of them were between the ages of 26 and 30 years. Most of the patients were married (68.3%), of low parity [Para 0 and 1] (61.9%) and had attained at least a secondary level of education (83.5%).

In table 2, the commonest identified risk factor was previous abortion (72.7%). In those who had recently used contraceptives, the commonest method employed was the levonorgestrel-containing emergency pill, Postinor™ (44.2%). 5.0% of the women had a previous EP. From table 3, abdominal pain was the most frequent symptom occurring in all the patients. Most of the patients (36.0%) presented with at most 6 weeks of amenorrhoea, 1 out of 10 of the women did not miss their period while 16.5% had uterine evacuation before the correct diagnosis of EP was made. 67.6% of the patients had moderately severe anaemia.

52 out of 139 cases of EP (37.4%) had abdominal paracentesis. Although there was one patient whose paracentesis' result was not documented, 44 / 52 (84.6%) had positive outcome, 6 / 52

Table 1: Socio-demographic characteristics of the patients.

| VARIABLE | FREQUENCY | % |
|---------------------------|-----------|------|
| AGE (years) | | |
| ≤ 20 | 8 | 5.8 |
| 21 – 25 | 32 | 23.0 |
| 26 – 30 | 40 | 28.8 |
| 31 – 35 | 34 | 24.5 |
| 36 – 40 | 20 | 14.4 |
| >40 | 5 | 3.6 |
| MARITAL STATUS | | |
| Married | 95 | 68.3 |
| Single | 38 | 27.3 |
| Separated | 4 | 2.9 |
| Widowed | 2 | 1.4 |
| PARITY | | |
| 0 | 44 | 31.7 |
| 1 | 42 | 30.2 |
| 2 | 22 | 15.8 |
| 3 | 12 | 8.6 |
| 4 | 11 | 7.9 |
| 5 | 4 | 2.9 |
| 6 | 4 | 2.9 |
| LEVEL OF EDUCATION | | |
| No Formal | 6 | 4.3 |
| Primary | 17 | 12.2 |
| Secondary | 64 | 46.1 |
| Tertiary | 52 | 37.4 |

Table 2: Possible risk factors.

| VARIABLE | FREQUENCY | % |
|----------------------------|-----------|------|
| Previous abortions | 101 | 72.7 |
| Recent contraceptives | 43 | 30.9 |
| Postinor | 19/43 | |
| IUCD | 9/43 | |
| Condom | 8/43 | |
| Depo provera/Noristerat | 7/43 | |
| Pelvic adhesions (intraop) | 27 | 19.4 |
| Previous abdominal surgery | 20 | 14.4 |
| Previous EP | 7 | 5.0 |

NB: Some patients had multiple risk factors. intraop. = intraoperative.

were non-diagnostic and 1 (1.9%) was negative. The results of the abdominal paracentesis was tabulated against the status of the Fallopian tube in tables 4,5. Revealed that in 47 out of the 139 patients, a different diagnosis from EP was entertained at presentation, with varieties of abortion and gastrointestinal disorders topping the list.

The commonest method of abdominal opening was via a Pfannenstiel incision. More than a quarter (26.7%) of the women had intraperitoneal haemorrhage measuring at least

2000 millilitres, while the ectopic sac was located in the right Fallopian tube in 59.7%, sited in the ampulla in 65.5% of cases and the commonest surgical procedure was salpingectomy via a laparotomy (Table 6). One patient had an unruptured EP.

Data from table 7 highlighted the following: one woman received 5 units of blood while 2 also had autologous transfusion. There was 1 maternal death giving a case fatality rate of 0.7%.

Table 3: Clinical presentation.

| VARIABLE | FREQUENCY | % |
|----------------------------|-----------|-------|
| Abdominal pain | 139 | 100.0 |
| Vaginal bleeding | 70 | 50.4 |
| Amenorrhoea (weeks) | | |
| ≤ 6 | 50 | 36.0 |
| 7 | 17 | 12.2 |
| 8 | 22 | 15.8 |
| 9 | 13 | 9.4 |
| ≥ 10 | 22 | 15.8 |
| Period not missed | 15 | 10.8 |
| Fainting spells | 57 | 41.0 |
| Shoulder tip pain | 8 | 5.8 |
| Cervical motion tenderness | 87 | 62.6 |
| Uterine evacuation | 23 | 16.5 |
| Preoperative PCV (%) | | |
| ≥ 30 | 21 | 15.1 |
| 27 – 29 | 24 | 17.3 |
| 19 – 26 | 71 | 51.1 |
| ≤ 18 | 23 | 16.5 |

NB: Some patients had multiple symptoms and signs.

Table 4: Outcome of Abdominal paracentesis.

| Outcome | Tubal Status | | Total |
|----------------|--------------|------------|-------|
| | Ruptured | Unruptured | |
| Positive | 44 | 0 | 44 |
| Non-diagnostic | 6 | 0 | 6 |
| Negative | 0 | 1 | 1 |
| Not done | 87 | 0 | 87 |
| Uncertain* | 1 | 0 | 1 |
| Total | 138 | 1 | 139 |

*The result of one patient who had paracentesis was not documented.

Table 5: Diagnostic errors made at presentation, n = 47.

| Diagnosis | Frequency | % |
|--------------------------------------------------------|-----------|------|
| Varieties of abortion (incomplete, septic, threatened) | 14 | 29.8 |
| Enteric fever / Enteritis | 10 | 21.3 |
| Appendicitis | 6 | 12.8 |
| Perforated viscus | 5 | 10.6 |
| Ovarian cyst accident | 3 | 6.4 |
| Pelvic inflammatory disease | 3 | 6.4 |
| Intestinal obstruction | 2 | 4.3 |
| Complications of fibroids (degeneration, menorrhagia) | 2 | 4.3 |
| Peptic ulcer disease | 1 | 2.1 |
| Anal fissure | 1 | 2.1 |

Table 6: Surgical findings.

| VARIABLE | FREQUENCY | % |
|------------------------|-----------|------|
| INCISION | | |
| Pfannenstiel | 85 | 61.2 |
| Midline Infraumbilical | 51 | 36.7 |
| Joel-Cohen | 3 | 2.2 |
| HAEMOPERITONEUM (ml) | | |
| <500 | 21 | 15.1 |
| 500 – 999 | 20 | 14.4 |
| 1000 – 1499 | 33 | 23.7 |
| 1500 – 1999 | 28 | 20.1 |
| 2000 – 2499 | 13 | 9.4 |
| ≥2500 | 24 | 17.3 |
| TYPE OF SURGERY | | |
| Salpingectomy | 117 | 84.1 |
| Salpingo-oophorectomy | 6 | 4.3 |
| Cornual resection | 8 | 5.8 |
| Combined procedures | 8 | 5.8 |
| LOCATION | | |
| Right | 83 | 59.7 |
| Left | 56 | 40.3 |
| ANATOMICAL SITE | | |
| Ampulla | 91 | 65.5 |
| Isthmus | 18 | 12.9 |
| Interstitial | 16 | 11.5 |
| Fimbria | 14 | 10.1 |

NB: Combined procedures include salpingectomy/corneal resection with any of the following: contralateral neosalpingostomy, myomectomy, contralateral tubal ligation, ovariectomy and ovarian cystectomy.

Table 7: Postoperative events.

| VARIABLE | FREQUENCY | % |
|--------------------------------|-----------|------|
| Homologous transfusion (pints) | | |
| 0 | 44 | 31.7 |
| 1 | 33 | 23.7 |
| 2 | 33 | 23.7 |
| 3 | 19 | 13.7 |
| 4 | 9 | 6.5 |
| 5 | 1 | 0.7 |
| Autologous + Homologous | 2 | 1.4 |
| Wound sepsis | 1 | 0.7 |
| ICU admission | 0 | 0.0 |
| Jaundice | 1 | 0.7 |
| Mortality | 1 | 0.7 |
| Hospital stay (days) | | |
| ≤4 | 121 | 87.0 |
| 5 – 7 | 15 | 10.8 |
| ≥8 | 3 | 2.2 |

NB: ICU = intensive care unit.

Discussion

Observational studies have suggested that the incidence of EP in developing countries especially on the African continent has probably increased in recent decades [7]. The results from this study showed an incidence of 1.8% or 1 in 55 deliveries. In most of Europe and North America, the incidence of EP is estimated to be 2% of live births [13], while Berg, et al. [14], observed that the incidence increased from 1.9% to 2.3% of live births between 1981 and 1991 in the United States. Studies from Nigeria showed that the incidence in Sokoto in Northern Nigeria was 18.1 per 1,000 deliveries [15], while it increased, between 1977 – 1987, from 0.4% to 1.7% at Ile-Ife in Southwest Nigeria [16]. These public institution-based reports may not reflect the true incidence in our environment. Also, since post-mortems are not routine in many hospitals in Nigeria [15], it is possible that maternal deaths caused by EP are not substantiated by autopsies, thereby giving the impression of an extremely low fatality rate.

EP was commoner in married, young women who were just commencing their reproductive careers. This is similar to findings from other studies [8,17–19]. The fact that EP has been associated with a lowering of reproductive potential makes this a disturbing finding because of the emotional and psychological problems associated with reproductive failure in an environment where emphasis is placed on childbearing [20,21].

The commonest factor associated with EP in this study was previous abortion. Orhue et al. [22] and Okonofua, et al. [23], have documented the contribution of previous induced abortion to the occurrence of tubal EP. This has been implicated as the main reason for the increased incidence of EP in resource-poor nations while earlier diagnosis, conservative management of tubal EP and increasing use of assisted reproductive technologies are responsible for the increase in developed countries [24]. The finding that most of the women were six weeks' amenorrhoeic or less at presentation underscores the need for improved facilities for the detection and localization of early pregnancies in our environment. Only 30.9% of the women were currently on or had recently used a contraceptive when they had the EP. As was observed in this study, the levonorgestrel-containing pill has been associated with a higher incidence of EP if a woman conceives while on the method. This may be attributable to the progestogen-induced slowing of tubal motility making it possible for the zygote to implant in the Fallopian tube [25]. Also of grave concern is the fact that 16.5% of the patients had uterine evacuation because of wrong diagnosis before presenting to the hospital. These clandestine and largely unsafe procedures only end up delaying presentation for appropriate care and increase morbidity.

EP was confirmed at laparotomy in 84.6% of those who had positive paracentesis. In a prospective study on the use of abdominal paracentesis in the diagnosis of suspected EP, the procedure was performed on 189 patients, of whom 132 were subsequently shown to have ectopic pregnancies. Paracentesis confirmed the diagnosis in 120 of the 132 (90.9%)

cases, but when this was corrected to exclude cases where no intraperitoneal haemorrhage was present, the success rate rose to 96.3% [26]. While culdocentesis in diagnosing EP has been widely studied with a success rate of between 70 – 90% [27], this study as well as others from developing nations [15,21,28], have shown that abdominal paracentesis compares favourably with culdocentesis as an aid in the diagnosis of EP. Also, it is cheap, minimally invasive, requires minimal equipment, can be easily learnt by any cadre of medical doctors [15] and the incidence of clinically significant bleeding during paracentesis is extremely low [29].

Thus, a suitable diagnostic algorithm in resource-constrained settings which could guide the decision for immediate intervention can be developed. This could include abdominal paracentesis for patients in whom a clinical suspicion of ectopic pregnancy (from symptoms like abdominal pain, amenorrhoea and finding of cervical motion tenderness with positive qualitative hCG test) exists, and who present at a time when expeditious diagnosis is desired but sophisticated diagnostic modalities, such as ultrasonography and sensitive human chorionic gonadotrophin (hCG) assays, cannot be obtained without significant delay.

EP can be very difficult to diagnose at the initial presentation [30]. One-third of the cases in this study were misdiagnosed at presentation. This is higher than the finding at Ile-Ife, Nigeria [30], but similar to that of Brenner, et al., who stated that one-third of their patients had been seen once and 11% twice before the right diagnosis of EP was made [31]. The list of diagnostic errors (such as pelvic inflammatory diseases, cholera, acute appendicitis, typhoid enteritis, incomplete septic abortion, uterine fibroid with menorrhagia, malaria, gastroenteritis, peptic ulcer and intestinal obstruction) is similar to findings by other authors [30,32,33]. Initial misdiagnosis has been associated with significant morbidity including prolonged hospital stay, and increased hospital costs. Colleagues from other specialities should be educated to increase their suspicion of ectopic pregnancy in any woman of childbearing age and perform the appropriate investigations. This reinforces the traditional maxim, "think ectopic"! While physicians must seek EP where it is suspected, women, especially those at increased risk, must be educated to suspect EP and promptly seek care [32].

Diagnosis of ectopic pregnancy (EP) has been made using transvaginal ultrasonography, serial beta-hCG evaluation and laparoscopy. Sometimes, the final confirmation of an EP is only made after the insertion of a laparoscope. Towards the end of the last century, advances in laparoscopic surgeries revolutionized the management of EP such that techniques such as laparoscopic resection and laparoscopic salpingectomy became the preferred approaches.

However, in many developing nations of the world, due to poor power supply and grossly deficient infrastructure, the logistic support for the widespread availability of laparoscopic techniques is non-existent. This has led to lack of training and expertise. The scarce resources make the facility out of the reach of majority of the citizens, and the routine use of

laparoscopic procedures is generally absent. The available option is thus laparotomy.

Most of the surgeries were performed using the low transverse (Pfannenstiel) incision. Although other authors have suggested that the midline incision should be used for laparotomies because of the speed of abdominal entry, Burger, et al., in a review of prospective randomized and retrospective studies on abdominal incisions concluded that transverse operations should be preferred for small or gynaecological operations while the use of the midline incision should be restricted to operations in which unlimited access to the entire abdominal cavity is useful or necessary [34]. Salpingectomy by laparotomy remains the commonest option of management in low resource settings because of late presentation to the hospital and significant tubal damage [35]. The only patient with unruptured EP was managed surgically because the criteria for satisfactory outcome after medical management [36], were not met. There was a preponderance of the EP on the right side. This was similar to findings by Nordenskjöld and Ahlgren who attributed this finding to the occurrence of appendicitis [37].

More than one-fourth of the patients had massive intraperitoneal haemorrhage and about 1 in 6 women were severely anaemic at presentation. The problem of haemorrhage with the need for blood transfusion, especially in our environment where unsafe blood transfusion due to transmission of Human Immunodeficiency Virus (HIV) and serum Hepatitis still occurs, is also of paramount concern [38]. This may be mitigated by the use of autologous transfusion. Although not widespread in low resource settings, autologous blood transfusion has been shown to be less expensive when compared with homologous transfusion as the latter is associated with increased infectious morbidity and prolonged hospital stay [39].

A new area of research has been identified by this study. Larger controlled studies with sufficient power can help in examining the sensitivity and specificity of the diagnostic aids for EP available in most developing countries with the aim of developing a diagnostic scoring index to guide practitioners in settings with scarce facilities and personnel.

Conclusion

Ectopic pregnancy, the quintessential gynaecological emergency, is a significant cause of early pregnancy-related morbidity and mortality in our environment, with a longer term effect on the reproductive potential of the patients. Significant improvement on the future obstetric career of women with EP could be made if efforts were focused on primary prevention and early pregnancy diagnosis to prevent tubal damage. Information dissemination in the community on the risk factors should be encouraged. Also, hospitals should be equipped with appropriate cadre of staff and facilities for the early diagnosis and prompt treatment of cases to reduce the morbidity, mortality and longer-term subfertility associated with this condition. Lack of resources mean that the picture may remain dismal for some time to come in the developing

world, but the development of basic diagnostic algorithms, improved training and the widespread use of basic resources may go a long way in improving the situation.

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